WHAT IS CLAIMED IS:

1. A method for recovering missing data in a digital signal, comprising the steps of:

(a) grouping non-missing data elements in at least one region in which at least some data is missing into n layers, where n is an integer greater than or equal to 1;

(b) assigning an initial value to each missing data element in the at least one region; and

(c) for each of the n layers

(c)(1) evaluating a plurality of orthogonal transforms over layer n,

(c)(2) thresholding select transform coefficients in layer n using a threshold to determine a set of transform coefficients that have absolute values below the threshold,

(c)(3) constructing a selection matrix using the set of transform coefficients determined in (c)(2),

(c)(4) constructing a system of linear equations based on the selection matrix constructed in (c)(3), and

(c)(5) solving the system of linear equations constructed in (c)(4) to solve for the missing data elements in layer n.

2. The method of claim 1, wherein each of operations (c)(1) through (c)(5) is performed only once per layer.

3. The method of claim 1, wherein the thresholding comprises hard-thresholding.

4. The method of claim 1, wherein the at least one region in which at least some data is missing contains at least one of an edge or a texture feature.

5. The method of claim 1, wherein the plurality of orthogonal transforms comprises (i) a discrete cosine transform and a predetermined number of its overcomplete shifts, (ii) a wavelet transform and a predetermined number of its overcomplete shifts, or (iii) a Fourier transform and a predetermined number of its overcomplete shifts.

6. The method of claim 1, wherein the digital signal is an image or video frame comprised of a plurality of pixels and the at least one region in which at least some data is missing comprises at least some pixels that are missing.

7. The method of claim 6, wherein all of the pixels from the at least one region are missing.

8. A method for recovering missing data in a digital signal representing an image, comprising the steps of:

(a) adaptively determining a selection matrix for each of n layers of a region in which at least some data is missing, n being an integer greater than or equal to 1;

(b) constructing a system of linear equations based on each selection matrix; and

(c) solving each constructed system of linear equations to solve for the missing data in the corresponding layer n.

9. The method of claim 8, wherein the selection matrix for each of n layers is adaptively determined based on the image and information in an area surrounding the region in which at least some data is missing.

10. The method of claim 8, wherein the selection matrix for each of n layers is adaptively determined by adaptively determining, based on the image and information in an area surrounding the region in which at least some data is missing, a set of transform coefficients that have absolute values below a threshold, and then determining the corresponding selection matrix therefrom.

11. An apparatus for predicting lost regions in a digital representation, the apparatus comprising one or more components configured to:

group non-missing data elements in at least one region in which at least some data is missing into n layers, where n is an integer greater than or equal to 1;

assign an initial value to each missing data element in the at least one region; and

for each of the n layers

(1) evaluate a plurality of orthogonal transforms over layer n,

(2) threshold select transform coefficients in layer n using a threshold to determine a set of transform coefficients that have absolute values below the threshold,

(3) construct a selection matrix using the set of transform coefficients determined in (2),

(4) construct a system of linear equations based on the selection matrix constructed in (3), and

(5) solving the system of linear equations constructed in (4) to solve for the missing data elements in layer n.

12. The apparatus of claim 11, wherein each of the operations (1) through (5) is performed only once per layer.

13. The apparatus of claim 11, wherein the threshold operation comprises hard-thresholding.

14. The apparatus of claim 11, wherein the at least one region in which at least some data is missing contains at least one of an edge or a texture feature.

15. The apparatus of claim 11, wherein the plurality of orthogonal transforms comprises (i) a discrete cosine transform and a predetermined number of its overcomplete shifts, (ii) a wavelet transform and a predetermined number of its

overcomplete shifts, or (iii) a Fourier transform and a predetermined number of its overcomplete shifts.

16. The apparatus of claim 11, wherein the digital signal is an image or video frame comprised of a plurality of pixels and the at least one region in which at least some data is missing comprises at least some pixels that are missing.

17. The apparatus of claim 16, wherein all of the pixels from the at least one region are missing.

18. An apparatus for predicting lost regions in a digital representation, the apparatus comprising one or more components configured to:

adaptively determine a selection matrix for each of n layers of a region in which at least some data is missing, n being an integer greater than or equal to 1;

construct a system of linear equations based on each selection matrix; and

solve each constructed system of linear equations to solve for the missing data in the corresponding layer n.

19. The apparatus of claim 18, wherein the one or more components configured to adaptively determine a selection matrix for each of n layers is configured to adaptively determine each selection matrix based on the image and information in an area surrounding the region in which at least some data is missing.

20. The apparatus of claim 18, wherein the one or more components configured to adaptively determine a selection matrix for each of n layers is configured to adaptively determine, based on the image and information in an area surrounding the region in which at least some data is missing, a set of transform coefficients that have absolute values below a threshold, and then determine the corresponding selection matrix therefrom.

21. A machine-readable medium having a program of instructions for directing a machine to perform a process of predicting lost regions in a digital representation, the program comprising:

(a) instructions for grouping non-missing data elements in at least one region in which at least some data is missing into n layers, where n is an integer greater than or equal to 1;

(b) instructions for assigning an initial value to each missing data element in the at least one region; and

(c) instructions for performing the following operations on each of the n layers

(c)(1) evaluating a plurality of orthogonal transforms over layer n,

(c)(2) thresholding select transform coefficients in layer n using a threshold to determine a set of transform coefficients that have absolute values below the threshold,

(c)(3) constructing a selection matrix using the set of transform coefficients determined in (c)(2),

(c)(4) constructing a system of linear equations based on the selection matrix constructed in (c)(3), and

(c)(5) solving the system of linear equations constructed in (c)(4) to solve for the missing data elements in layer n.

22. The machine-readable medium of claim 21, wherein each of the operations (c)(1) through (c)(5) is performed only once per year.

23. The machine-readable medium of claim 21, wherein the instructions for thresholding comprises instructions for hard-thresholding.

24. The machine-readable medium of claim 21, wherein the at least one region in which at least some data is missing contains at least one of an edge or a texture feature.

25. The machine-readable medium of claim 21, wherein the plurality of orthogonal transforms comprises (i) a discrete cosine transform and a predetermined number of its overcomplete shifts, (ii) a wavelet transform and a

predetermined number of its overcomplete shifts, or (iii) a Fourier transform and a predetermined number of its overcomplete shifts.

26. The machine-readable medium of claim 21, wherein the digital signal is an image or video frame comprised of a plurality of pixels and the at least one region in which at least some data is missing comprises at least some pixels that are missing.

27. The machine-readable medium of claim 26, wherein all of the pixels from the at least one region are missing.

28. A machine-readable medium having a program of instructions for directing a machine to perform a process of predicting lost regions in a digital representation, the program comprising:

(a) instructions for adaptively determining a selection matrix for each of n layers of a region in which at least some data is missing, n being an integer greater than or equal to 1;

(b) instructions for constructing a system of linear equations based on each selection matrix; and

(c) instructions for solving each constructed system of linear equations to solve for the missing data in the corresponding layer n.

29. The machine-readable medium of claim 28, wherein the instructions for adaptively determining a selection matrix for each of n layers comprises instructions for adaptively determining each selection matrix based on the image and information in an area surrounding the region in which at least some data is missing.

30. The machine-readable medium of claim 28, wherein the instructions for adaptively determining a selection matrix for each of n layers comprises instructions for adaptively determining, based on the image and information in an area surrounding the region in which at least some data is missing, a set of

transform coefficients that have absolute values below a threshold, and then determining the corresponding selection matrix therefrom.

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